Space Weather Forecast

Issued on Tuesday, 05 December 2023 at 01:14 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance G1/Minor-Geomagnetic Storm early Day 1. Chance of isolated Moderate Class flares Days 1-2.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Low with the largest flare of the past 24 hours a Common Class flare from a region in the southeast, that is approaching centre disc. There are currently nine sunspot regions on the disc, most of which are relatively simple. One of the most complex regions is now on the southwest limb, and after a period of activity when it was centre disc, has been largely inactive. The other two regions of significance are in the southeastern quadrant and are now approaching centre disc. These are the most magnetically complex regions on the disc. The largest region on the disc is in the northeast. It consists of one large spot and a number of a number of smaller spots of mixed polarity emerging to the south of this main large spot. The remaining regions on the visible disc are mature and stable or in slow decay.

Despite a number of coronal mass ejection signatures evidenced in coronagraph imagery during the past 24 hours, none are considered Earth-directed. However, a filament eruption from near one of the southeastern spots around 04/07000 UTC produced a CME that may give a glancing blow on Day 3 (07 Dec).

Solar Wind / Geomagnetic Activity: Solar wind parameters have been indicative of the steady arrival of stream of fast winds from a coronal hole. Solar wind speeds rose from slightly elevated to elevated levels. The Interplanetary Magnetic Field was initially weak before rising to moderate levels after 04/0500 UTC, increasing more steeply around 04/1500 UTC. The important north-south component of the IMF (Bz), was largely positive with only brief spells at negative. Resultant Geomagnetic activity was Quiet throughout (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at Background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low with a chance for isolated Moderate flares (R1-R2 Blackouts) Days 1-2 (05-06 Dec), reducing to a slight chance on Days 3-4 (07-08 Dec). One region is set to depart the disc during Day 1, with a new region then expected to emerge from the eastern limb that has already produced a number of Common-class flares.

Solar Winds / Geomagnetic Activity: A coronal mass ejection that left the Sun on 01 Dec is expected to give a glancing blow at Earth early Day 1 (05 Dec). A filament eruption that left the Sun around 04/0700 UTC is expected to miss, but there is a slight chance of a glancing blow on Day 3 (07 Dec). No further CMEs are currently thought to be Earth-directed.

Enhancement of solar winds from a coronal hole fast stream is expected to persist through Days 1-2 (05-06 Dec) with winds at Elevated levels, possibly peaking around 600-620km/s Day 1. Winds are expected to slowly return to Slightly Elevated levels on Day 3 in the absence of any further CME enhancement.

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Geomagnetic activity is expected to be largely Quiet to Unsettled (Kp 0-3) through the forecast period There is a chance in the early hours of Day 1 that a combination of influences from the HSS and a potential CME arrival may see activity increase to Active (Kp 4) or G1/Minor Geomagnetic Storm (Kp 5) levels. There is a slight chance on Day 3 (07 Dec) that a glancing blow from a CME produce an Active or G1/Minor Geomagnetic Storm interval.

Auroral activity may become enhanced Day 1 (05 Dec) due to the onset of faster solar winds at Earth and the potential for further geomagnetic influence from a CME glancing blow. From the UK views of aurora may be possible across parts of Scotland and Northern Ireland late Monday night, with influence waning by the night of 05-06 Dec.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain at background levels with no Solar Radiation Storms expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	5	10	1
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	30	15	15
Very Active	R3 to R5 X	No	5	3	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	3	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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